Instruction Manual

HH81A, HH82A Digital Thermometers

CE

Thank you for purchasing this instrument.
For proper use, please read through this instruction manual prior to operation.

M3599/0600
Made in Japan

This instruction manual describes the Model HH82A, which has more functions than the Model HH81A. However, with the exception of the (CH) key, operation of the Model HH81A is performed in the same way.

1. Cautionary Notes for Safe Use of the Product

■ **The following safety symbols are used on this instrument and instruction manual to ensure safe use.**

⚠ **WARNING** This symbol found on the back of the instrument, calls attention to a potential danger or hazard capable of resulting in a serious injury or loss of life, and the operator must refer to this instruction manual to avoid the danger or hazard.

⚠ **WARNING**: This symbol in this manual indicates a potential danger or hazard capable of resulting in a serious injury or loss of life.

⚠ **CAUTION**: This symbol in this manual indicates a potential danger or hazard capable of resulting in severe but not irreversible injury or damage. In some instances, the hazards may be those associated with WARNING symbols but are of significantly less magnitude.

NOTE: This symbol draws attention to information that is essential for understanding how to operate the instrument and/or instrument features.

TIP: Gives information that complements the present topic.

■ **To avoid accidents, such as an electrical shock, which may lead to injury or loss of life to the operator, or damage to the equipment, be sure to observe the following precautions.**

⚠ WARNING

- Do not use the instrument to measure where there is the risk of electrical shock. Also, when using the 2-channel model, always keep the probe-to-probe potential below 1 V.
- When handling a needle-type probe, be careful not to point the tip in the direction of any person as doing so may result in an injury.
- After measuring anything with a high temperature, do not touch the metal part of the measuring probe as this may result in a burn.

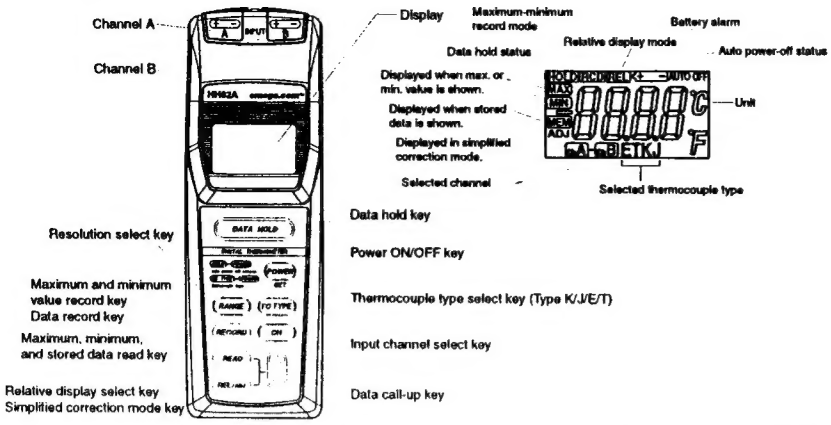
⚠ CAUTION

- When the instrument is stored for a long period of time, be sure to remove the batteries. Not doing so may result in a failure or malfunctioning of the instrument due to a leakage in battery liquid.
- Do not use deteriorated or damaged probes, as doing so will effect the precision of measurements.
- Before you detach the probe from the instrument, always remove the probe from the object being measured.
- When using a needle-type probe, do not insert the metal part of the measuring probe more than half its length into the object to be measured, as doing so may result in a burn or damage to the probe due to the handle of the probe heating up.
- Keep the handle of the probe and the cable that connects the probe to the instrument within a temperature range of -20°C to 50°C, as they are less resistant to heat than the metal part of the measuring probe.

■ **Regarding Disassembling and Modification**

Do not disassemble or modify the instrument in any way. The instrument should only be disassembled by a service engineer of omega.com.

2. Functional Description



Key	Operation and description	Display
Using the unit °F POWER SET	**To users who use Fahrenheit as the temperature unit:** To use the unit °F, follow the instructions below. ■ When turning on the power, keep the POWER SET key held down. • Verify that the display shows the °F symbol, and then release the key. • After completing this step, you can switch between °C and °F whenever you set the type of thermocouple. • By following the same procedure as above, you can revert to the condition in which only the unit °C is available.	°F
Power on POWER SET **Power off** POWER SET	■ Press this key to turn on the power. • The auto power-off function turns off the power automatically about 10 minutes after the last key operation of any key other than the POWER SET key. • To disable the auto power-off function, simultaneously press the POWER SET key and DATA HOLD key. With this function disabled, the instrument will stay powered continuously. ■ To turn off the power, press this key for 1 second or longer.	After the power has been turned on, all the elements of the display light up. **AUTO OFF**
Select thermo-couple type TC TYPE + POWER SET ↓ TC TYPE ↓ POWER SET	**To select a thermocouple type from K, J, E, and T:** If the power is already turned on, turn it off. ■ Press and hold down the TC TYPE key while pressing the POWER SET key to turn on the power. The thermocouple type and unit on the display flash, indicating that the instrument is ready for changing thermocouple type. ■ Every time the TC TYPE key is pressed the thermocouple type and unit (°C/°F) changes. ■ Press the POWER SET key to accept the setting. **TIP**: The factory-set default is type K.	**K, J, E, T**

Read maximum and minimum values

READ

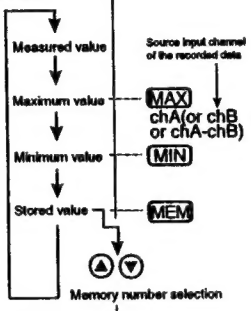
Read stored data

READ

▲ ▼

To read maximum and minimum values and stored data values from memory:

■ When the READ key is pressed, the display changes in the sequence shown in the figure on the right.



■ For stored data, select the memory number using the ▲ or ▼ key. After the memory number has been displayed for a few seconds, the value stored in that memory is displayed.

⚠ **NOTE:**

- This data reading is disabled during thermocouple type selecting or correction value setting.
- If you press the READ key when the REL mode is active, each of the MIN, MAX and MEM values is shown as a relative value based on the reference value (D1).
- The number of display digits of maximum and minimum/stored data depends on the current resolution setting, not the number of display digits at the time when the data was measured.

Channel switching and display when data is being read (TX10-03 only):

■ Data while measuring values from a single channel (either channel A or B)
Using the CH key, display the channel used when the data was measured. All of the maximum, minimum, and stored data values can be displayed.

■ Data when measuring the difference between values of two channels (channel A and B measurement)

- Pressing the CH key to select channel A or B shows the minimum and maximum values, as well as the memory value, measured on that channel.
- Pressing the CH key to select 'chA-chB' displays the stored values of the difference between channels A and B as well as the maximum or minimum difference values.

Burnout

— — — —

- When the probe is not connected to the input connector (or the sensor opens), a burnout mark is displayed.
- For the 2-channel mode, the burnout mark is displayed when the probe is not connected to the selected channel (channel A and B, or channel A-B)

Clear stored data

READ

▲ ▼

RECORD

To clear the recording memory:

■ Press the READ key to display stored data.

■ Select the memory number you wish to clear.

■ Press the RECORD key to clear the data.
To clear all the stored data in the memory at one time, press and hold the RECORD key for 1 to 2 seconds.
TIP: This operation does not affect the maximum and minimum values.

Select channel CH **(HH82A only)**	**To select the input channel from channel A, B, or A-B:** ■ Press this key. With each press, the display changes between A, B, and A-B, allowing you to select the input channel for measurement. ⚠ **NOTE**: • Channel switching is disabled during the RCD mode. • By switching the channels when data is being read, you can display the data of each channel: maximum and minimum values and measured data saved using the Memory-in function.	chA chB chA-chB
Hold DATA HOLD **Release hold** DATA HOLD	**Use this key to hold the measured value on LCD.** ■ To hold, press this key. ■ To cancel holding, press this key again.	HOLD
Select resolution RANGE	**To select a display resolution:** ■ Press this key. Every time this key is pressed, the display resolution alternates between 0.1°C and 1°C (within the range of -200.0°C to 199.9°C). If 0.1°C is selected, a resolution of 0.1°C is achieved when the display value is 199.9°C or below; when it goes over 200°C, the resolution changes to 1°C, and the number of display digits is switched automatically. When "chA-B" is selected, the display is switched to the input value of channel A or B, whichever is greater. **TIP**: • The resolution setting is maintained even after the power is turned off. The next time the power is turned on, the instrument starts up with the setting that was set before the power was turned off. • Factory-set resolution is 0.1°C.	
Relative display REL/ADJ **Cancel relative display** REL/ADJ	**To select relative display:** ■ Press this key to select a relative display. The display shows the difference (relative value) of a subsequent measured value (Dx) from the reading given as a reference value (D1) when this key was pressed. Relative display value = Dx-D1 The reference value affects measurements on all channels (channel A, channel B and channel A-B). Any value among MAX, MIN and MEM can also be used as the reference value. ■ To cancel relative display, press this key again.	REL
Set correction value REL/ADJ ▲ ▼ POWER SET	**To set the correction value for simplified correction:** The current temperature reading can be corrected to a value based on the reference thermometer. By thus eliminating probe-specific errors, you can take precision measurements over a frequently used temperature range. ⚠ **NOTE**: When you change the measurement probe, the correction value must be set again regardless of the thermocouple type. ■ Press and hold this key for 3 seconds. The ADJ on the display flashes, indicating that the instrument is ready for setting. ■ While measuring the reference temperature, correct the display value to an optional value using the ▲ and ▼ keys. (The correction range is ±20°C of the measured value. Resolution of the correction value is determined according to the resolution setting.) **TIP**: Holding down the ▲ or ▼ key increases the speed with which the display value changes. ■ Press the POWER SET key to accept the setting.	**ADJ flashes.**

Simplified correction mode

REL/ADJ

Cancel simplified correction mode

REL/ADJ

Use this key to enter and exit the simplified correction mode:

ADJ

■ To enter, press this key for 1 to 2 seconds.

■ To exit, press this key for 1 to 2 seconds again.

Record maximum and minimum values

RECORD

Cancel recording

RECORD

Recording of the maximum and minimum values:

Detection and recording of the max./min. values starts when this key is pressed and continues until this key is pressed again or the power is turned off.

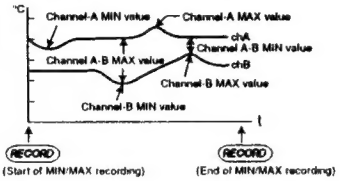
RCD

■ To start recording, press this key.

⚠ **NOTE**: Enable the RCD mode after selecting the channel.

■ To stop the recording, press this key again.

• Measurement on channel A-B is done as described below.
Press the READ key to read the minimum and maximum values. With the ON key, select channel A or B. The display shows the MIN and MAX values for each channel.



⚠ **NOTE**:

- The maximum and minimum values are stored in internal memory even after recording is cancelled. The data will be updated when the RCD mode is enabled again.
- If you enable the RCD mode when the REL mode is active, the reading changes to a relative value. Nevertheless, the minimum and maximum of measured values (Dx) are stored in internal memory.
- Recorded maximum and minimum values can be referenced even after the power is turned off and on again because they are stored in memory until the RCD mode is enabled next time.
- Auto power-off is cancelled during the RCD mode.

Memory-in

DATA HOLD

↓

RECORD

↓

▲ ▼

↓

RECORD

To store data in internal memory (maximum of 10 data items):

HOLD

MEM

■ Press the DATA HOLD key to hold the measured value.

■ Press the RECORD key.
The display automatically shows the smallest memory number under which no data has been recorded. At this point, the MEM symbol turns on to indicate that the thermometer is in the "Memory-in" mode.

■ Use these keys to select a desired memory number under which you want to record data. In this step, you can also check the existing data value.
TIP: Pressing the DATA HOLD key while a memory number is being displayed cancels the memory-in function (returns to measurement mode).

■ Press the RECORD key to store the data.
TIP: The HOLD and MEM symbols indicate that the value recorded with the memory-in function is being held and shown. Press the DATA HOLD key to return to normal measurement mode.

3. Measurement

This instrument can connect any of the 4 types of thermocouples: Type K, J, E, or T (it is set to Type K at shipment from the factory). Use an OMEGA-type connector corresponding to the TC type for the probe.

(1) Load the batteries (see section 5, Battery Replacement).

(2) Press the (POWER)SET key to turn on the power.

When the power has been turned on, all indications on the display light up for about 2 seconds, then a measured value appears.

(3) Check the thermocouple type.

If you wish to change the current setting, turn off the power and follow the instructions in the section Select thermocouple type on the previous page.

(4) Select the input channel. (HH82A only)

Press the (CH) key and select one channel from channel A, B, and A-B (see Select channel on the previous page).

(5) Connect the probe to the input connector.

If you are using the 2-channel model (HH82A), connect the probe(s) to the channel(s) you are using.

(6) When you have finished measurement, turn off the power by pressing the (POWER)SET key.

- The power may be turned off by the auto power-off function during measurement. In this case, press the (POWER)SET key to restart the instrument and continue measurement.
- If the power is turned off and then on again, the instrument restarts with the same settings of the resolution (0.1°C or 1°C), input channel (channel A, B or A-B) and thermocouple type (K, J, E or T) as before it was turned off.

(7) Other operations

For other operations such as display hold, relative display, and maximum and minimum record/readout, see the key operation list on the previous page.

⚠ NOTE

Key operation of this instrument is comparatively easy. However, it is necessary to make sure that the instrument is not mistakenly set to a state other than that intended. Note that, under normal measurement, "HOLD," "RCD," "REL," "MAX," "MIN," and "MEM" are not displayed.

4. Precautionary Notes

⚠ NOTE

- Each probe has its own maximum and minimum operating temperatures, so ensure that its temperature does not fall outside the specified range.
- As the probe is susceptible to corrosion, do not use the instrument for the measurement of gas or liquid, and refrain from measuring semi-solid particles and semi-viscous substances. After measurement, wipe the probe with a dry cloth.
- Do not apply a strong force to the upper and lower parts of the probe as doing so may result in the bending of the probe connector.
- When using the instrument be careful not to bend, drop, or strike the measurement probe.
- When measuring surface temperature using a surface-type probe, position the probe perpendicular to the surface of the object. Also note that the application of oil to the probe for the means of providing better contact can improve measurement accuracy.
- When measuring non-metallic surface temperature, make sure the measurement time is long enough to compensate for poor thermal conductivity.
- To ensure stable measurement, the instrument should not be subjected to a sudden temperature change.
- This instrument, with the exception of the connector section, is water-resistant but not waterproof. Therefore the instrument should not be immersed in water. If it is mistakenly immersed in water, remove it immediately and check to ensure that no water has penetrated inside the case. Although this instrument is designed so that any water penetrating into the connector does not permeate into the circuit inside the case, try to prevent any water entering the connector. If water does enter the connector, the burnout display may be unavailable.

5. Battery Replacement

When the batteries approach the end of their lives, the ⊖ ⊖ mark appears on the display. If this mark is displayed, replace the batteries.

To replace the batteries:

(1) Remove the battery box cover from the back of the instrument. Then replace the two AA alkaline dry batteries (LR6).

(2) Refit the cover to the battery box.

⚠ NOTE

- When inserting batteries, be careful not to mistake the polarity as this can damage the instrument.
- When the instrument is to be stored for a long period of time, remove the batteries.

- Do not leave dead batteries in the instrument as doing so may result in a failure or malfunction of the instrument due to a leakage in battery liquid.
- Both batteries should be replaced with new ones at the same time as replacing only one of the batteries may result in the charge leaking from the new battery to the old.

6. Cleaning

- If the instrument becomes dirty, wipe the instrument with a cloth that has been dampened with water and well wrung.
- If the instrument is very dirty, use a cloth that has been dampened with a diluted neutral detergent. Do not use other detergents, solvents, or chemicals. Doing so may cause a failure of the instrument.
- Avoid any water or other liquids from splashing onto the connector, as this may cause a failure of the instrument.

7. Maintenance Service

For maintenance or repairs, contact OMEGA Engineering, Inc., Customer Service Dept. at 1-800-622-2378.

8. Specifications

Performance Specifications

Thermocouple type	K, J, E, T
Measurement channels	1ch or 2ch (2ch, multi-function model only)
Measuring range	Type K: -200°C to 1372°C [-328°F to 2501.6°F] Type J: -200°C to 1000°C [-328°F to 1832°F] Type E: -200°C to 700°C [-328°F to 1292°F] Type T: -200°C to 400°C [-328°F to 752°F]
Measurement resolution	-200.0°C to 199.9°C: 0.1°C or 1°C (when 1°C resolution is set) 200°C or higher: 1°C
Accuracy (instrument)	-200.0°C to -100.1°C: 0.1% of rdg + 1.0°C -100.0°C to 199.9°C: 0.1% of rdg + 0.7°C 200°C or higher, or when 1°C resolution is set: 0.2% of rdg + 1°C
Temperature coefficient	±(0.015% of rdg +0.06°C)/°C
Measurement cycle	Approx. 1 second (1ch model; 2ch model when performing 1ch measurement) Approx. 2 seconds (2ch model when performing 2ch measurement; with no range switching)
Operating environment	0°C to 50°C, 20 to 80% RH (no condensation)
Storage environment	-10°C to 60°C, 5 to 95% RH (no condensation)
Power requirements	Two AA alkaline dry batteries (LR6)
Battery life	Approx. 450 hours

General Functions

Display	Reflective LCD; 7-segment, 4-digit display and 30 character segments
Computing function	MAX/MIN, REL Difference between 2 channels (2ch model only)
Battery alarm	Displayed on LCD
Key operation sound	Internal buzzer sounds during key operation
Auto power-off	Turns off the power 10 minutes after the last key operation (can be disabled)
Range hold function	Controls the range switching between -200.0°C to 199.9°C (0.1°C resolution), and 200°C or higher (1°C resolution).
Simple memory function	Stores up to 10 data items in memory. Displays memory number and stored data value.
Drip-proof construction	Protection Class IP-54
Simplified correction function	Based on the reference value entered manually

Dimensions and Weight

External dimensions	Approx. 151(H) × 56(W) × 33(D) mm (excluding protrusions)
Weight	Approx. 180 g (including batteries)

Compliance with Standards

EMC standards	EMI (interference signal): EN55011:1998, EN61326-1:1998+A1 (Class B, Group 1) EMS (immunity): EN50082-1:1997, EN61326-1:1998+A1
Emission immunity	The accuracy ratings of all ranges are the sum of the accuracy levels in standard applications and the accuracy tolerances shown below, where the overall length of cable, including the probe, is assumed to be shorter than 3 m. Accuracy tolerance of all available ranges: ±5% of span (Tested at 3 V/m and for standard applications)

Accessories

Instruction manual
Two AA alkaline dry batteries (LR6)

9. Regarding This Manual

- The contents of this manual are subject to change without prior notice.
- This manual is intended to describe the functions of this instrument, not to guarantee that the functions are suited to the particular purpose of the user.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal one (1) **year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR <u>WARRANTY</u> RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR <u>NON-WARRANTY</u> REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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